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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/658,933  | 09/09/2003  | Christophe Pierrat   | NTI-007-1D          | 3106             |
| 29477   | 7590        | 11/16/2006           | EXAMINER            |                  |
| BEVER HOFFMAN & HARMS, LLP<br>2099 GATEWAY PLACE<br>SUITE 320<br>SAN JOSE, CA 95110 |             |                      | LUU, CUONG V        |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2128                |                  |

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/658,933

Applicant(s)

PIERRAT ET AL.

Examiner

Cuong V. Luu

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2, 3, 6 and 7 is/are allowed.
- 6) ☒ Claim(s) 1, 4-5, and 8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

Claims 1-8 are pending. Claims 1-8 have been examined. Claims 2-3 and 6-7 have been allowed. Claims 1, 4-5, and 8 have been rejected.

The Examiner would like to thank the Applicant for the well-presented response, which was useful in the examination. The Examiner appreciates the effort to perform a careful analysis and make appropriate amendments to the claims.

### ***Response to Arguments***

1. Applicant's arguments, see page 7, filed 8/24/2006, with respect to U.S.C. 112, 2<sup>nd</sup> paragraph rejections of claims 1-8 have been fully considered and are persuasive. The U.S.C. 112, 2<sup>nd</sup> paragraph rejections of claims 1-8 have been withdrawn.
2. Applicant's arguments, see page 7, filed 8/24/2006, with respect to U.S.C. 101 rejections of claims 1-8 have been fully considered, but they are not persuasive. The "tool set" that does not produce real world result does not necessarily tie to a machine. In addition, the applicant states that a tool set can be implemented using computer software. This is equivalent to claiming software. Therefore, "tool set" here is non-statutory.
3. Applicant's arguments filed 8/24/2006 regarding claim 1, see page 8, have been fully considered but they are not persuasive. The applicant argues that Kachwala does not teach, "means for providing a same rim width in the subset of the structures based on edges provided by the means for analyzing", specifically because Kachwala only teaches that OPC is required for dense features. The examiner respectfully disagrees. The applicant claims a

tool set to perform this limitation, and Kachwala teaches a tool set for performing this limitation. The argument of Kachwala only teaches that OPC is required for dense features does not change the fact the Kachwala does teach a tool set for comprising "means for providing a same rim width in the subset of the structures based on edges provided by the means for analyzing". Claim 1, therefore, remains rejected.

4. Based on the discussions in item 3 above, claim 5 remains rejected.
5. Applicant's arguments filed 8/24/2006 regarding claims 4 and 8, see page 8, have been fully considered but they are not persuasive. The applicant argues that Kachwala does not disclose or suggest how to provide the recited rim width i.e. by downsizing the attenuated region. Kachwala teaches well controlling the CD and overlay of chrome to the attenuating layer within tolerance. This inherently implies that the rim width must be controlled within tolerance of the OPC method by downsizing or upsizing to achieve that goal. Claims 4 and 8, therefore, remain rejected.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

**Claims 1, 4-5, and 8 are rejected under 35 U.S.C. 102(a) as being anticipated by Kachwala et al, herein Kachwala, (High Transmission Attenuated PSM- Benefit and Limitations**

through a Validation Study of 33%, 20% and 6% Transmission Masks, Optical Microlithography XIII, Vol. 4000, 27 February – 3 March, 2000, Santa Clara, CA, USA).

1. As per claim 1, Kachwala teaches a tool set for simulating a tri-tone attenuated phase-shifting mask including a plurality of structures, a subset of the structures including a transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim (the abstract), the tool set comprising:
  - means for analyzing optical proximity correction for the subset of the structures (p. 3, paragraph 5, lines 3-4 of this paragraph); and
  - means for providing a same rim width in the subset of the structures based on edges provided by the means for analyzing (p. 5, paragraph 1).
2. As per claim 4, Kachwala teaches a tool set for simulating a tri-tone attenuated phase-shifting mask including a plurality of structures, a subset of the structures including a transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim (the abstract), the tool set comprising:
  - means for analyzing optical proximity correction for the subset of the structures (p. 3, paragraph 5, lines 3-4 of this paragraph); and
  - means for providing a same rim width in the subset of the structures based on edges provided by the means for analyzing (p. 5, paragraph 1).
  - the means for providing includes means for downsizing the attenuated region to generate the same rim width (p. 5, paragraph 1. Kachwala et al's recitation of reducing the tolerance for dense region suggests downsizing the attenuated region to generate the same rim width).

3. As per claim 5, Kachwala teaches a tool set to convert an integrated circuit layout into an attenuated phase-shifting mask layout for fabricating the integrated circuit, the tool set comprising:

means for identifying a subset of structures in the integrated circuit layout (p. 5, paragraph 1. The recitation of having different tolerances for difference regions suggests means for identifying a subset of structures in the integrated circuit layout);

means for converting the subset of structures into the mask layout, wherein each converted structure includes a transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim (the abstract's recitation of (p. 2, section 2, lines 1-2 of paragraph 1. Tri-stone masks read on converting the subset of structures into the mask layout, wherein each converted structure includes a transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim);

means for analyzing optical proximity correction for a plurality of converted structures (p. 3, paragraph 5, lines 3-4 of this paragraph); and

means for providing a same rim width for the plurality of converted structures based on edges provided by the means for analyzing (p. 5, paragraph 1).

4. As per claim 8, this limitation has already been discussed in claim 4. It is, therefore, rejected for the same reasons.

***Allowable Subject Matter***

Claims 2-3 and 6-7 are objected to as being dependent upon a rejected base claims 1 and 5, respectively, but would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, and 35 U.S.C. 101 set forth in this Office action and in independent form including all of the limitations of the base claim.

The following is a statement of reasons for the indication of allowable subject matter:

5. As per claim 2, the prior art, Kachwala, teaches a tool set for simulating a tri-tone attenuated phase-shifting mask including a plurality of structures, a subset of the structures including a transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim (the abstract), the tool set comprising:
  - means for analyzing optical proximity correction for the subset of the structures; and
  - means for providing a same rim width in the subset of the structures based on edges provided by the means for analyzing;
  - means for dividing a first edge of the attenuated region into a plurality of first segments but does not teach:
    - means for dividing a second edge of the opaque region into a plurality of second segments, wherein each second segment corresponds to a certain first segment; and
    - means for determining whether a second segment moves with its corresponding first segment during optical proximity correction as recited in the claim invention
6. As per claim 3, the prior art, Kachwala, teaches a tool set for simulating a tri-tone attenuated phase-shifting mask including a plurality of structures, a subset of the structures including a

transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim (the abstract), the tool set comprising:

means for analyzing optical proximity correction for the subset of the structures; and

means for providing a same rim width in the subset of the structures;

but does not teach:

wherein the means for providing includes means for downsizing the attenuated region and then upsizing the attenuated region to generate the substantially similar rim width as recited in the claim invention.

7. As per claim 6, the prior art, Kachwala, teaches a tool set to convert an integrated circuit layout into an attenuated phase-shifting mask layout for fabricating the integrated circuit, the tool set comprising:

means for identifying a subset of structures in the integrated circuit layout;

means for converting the subset of structures into the mask layout, wherein each converted structure includes a transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim;

means for analyzing optical proximity correction for a plurality of converted structures;

and

means for providing a same rim width for the plurality of converted structures;

means for dividing a first edge of the attenuated region into a plurality of first segments;

but does not teach:

means for dividing a second edge of the opaque region into a plurality of second segments, wherein each second segment corresponds to a certain first segment; and



means for determining whether a second segment moves with its corresponding first segment during optical proximity correction

as recited in the claim invention.

8. As per claim 7, the prior art, Kachwala, teaches a tool set to convert an integrated circuit layout into an attenuated phase-shifting mask layout for fabricating the integrated circuit, the tool set comprising:

means for identifying a subset of structures in the integrated circuit layout;

means for converting the subset of structures into the mask layout, wherein each converted structure includes a transparent region, an opaque region, and an attenuated region, wherein the opaque region and the attenuated region form a rim;

means for analyzing optical proximity correction for a plurality of converted structures;

and

means for providing a same rim width for the plurality of converted structures;

but does not teach:

wherein the means for providing includes means for downsizing the attenuated region and then upsizing the attenuated region to generate the same rim width;

as recited in the claim invention.

**Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."**

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

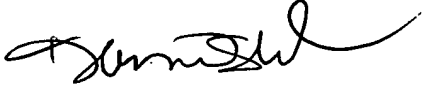
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cuong V. Luu whose telephone number is 571-272-8572. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah, can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. An inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group receptionist: 571-272-2100.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CVL



KAMINI SHAH  
SUPERVISORY PATENT EXAMINER